

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1-17, 19, 24-38, 42-54 and 57-60 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim Rejections - 35 USC § 103

3. Claims 1-2, 5, 7, 11, 13-14, 28-29, 42-43, 47 and 59-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Park (5,743,998) in view of Yoshimura et al (5,402,410).

Park teaches a process of transferring micro patterns using SOG resist media, wherein a surface of SOG layer (2) is irradiated with an electron beam to expose a portion (3) for altering the susceptibility of the portion of the SOG layer to etching (col.4, lines 42-49 and abstract); Park teaches that an intermediate layer (4) is formed in between the SOG and the sample substrate (6) of doped silicon wafer (col.6, lines 33-37); and the exposed region (3) is then removed by etching (col.6, lines 38-46 and figures 1A-1C).

Park teaches the intensity of the beam is increased or accelerated depending on the beam position (col.8, lines 61-col.9, line 15).

Park fails to teach the magnitude of an accelerating voltage of the electron gun for the electron beam is changed according to an irradiation position so that a depth of the exposed part of the SOG layer can be controlled.

However, Yoshimura et al teach a process of electron beam irradiation on a surface comprises photoresist material or spin coatable glass such as SOG (col.12, lines 18-20 and lines 59-62) to form desired patterns, wherein an acceleration voltage of an electron beam in order to efficiently form patterns with different depth or heights (col.8, lines 34-col.9, lines 40).

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of claimed invention to modify Park's process with the improved or efficient technique to form multilevel depth or height in predetermined plural areas on a surface as taught by Yoshimura et al with reasonable expectation of successes.

Park also teaches that a plurality of layers including second SOG layers can be used and etching the intermediate layer and the substrate and as well as the remaining SOG layer (col.10, lines 21-60).

4. Claims 2, 7-8,11,13-14,36,38,42-44,47 and 60-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyata et al (5,888,846) in view of Yoshimura et al (5,402,410).

Miyata et al teach a process for microfabricating diamond including the steps of irradiating a SOG of silicone (rubber) layer is disposed on an intermediate layer of resin

(5), wherein the ion beam (7) is radiated on the SOG silicone layer and radiated portion is removed by etching (col.6, lines 10-24).

Miyata et al also teach that the remaining SOG layer and the intermediate and the diamond are etched (col.6, lines 32-44 and also see abstract).

Miyata et al fails to teach the magnitude of an accelerating voltage of the electron gun for the electron beam is changed according to an irradiation position so that a depth of the exposed part of the SOG layer can be controlled.

However, Yoshimura et al teach a process of electron beam irradiation on a surface comprises photoresist material or spin coatable glass such as SOG (col.12, lines 18-20 and lines 59-62) to form desired patterns, wherein an acceleration voltage of an electron beam in order to efficiently form patterns with different depth or heights (col.8, lines 34-col.9, lines 40).

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of claimed invention to modify Miyata et al's process with the improved or efficient technique to form multilevel depth or height in predetermined plural areas on a surface as taught by Yoshimura et al with reasonable expectation of successes.

5. Claims 4,16-17,45,46,48 and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyata et al (5,888,846) in view of Hashimoto et al (5,169,494).

Miyata et al discusses above in the paragraph and teach that the resist is a general novolac resist (col.6, lines 3-7) but fails to teach the intermediate resin layer comprises PMMA.

However, in a fine patterning process, Hashimoto et al teach the use of organic polymeric resist material comprises PMMA to form the bottom resist layer (2) (col.5, lines 1-10 and col. 6, lines 49-52).

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of claimed invention to employ Hashimoto et al's teaching into Miyata et al's resin intermediate material because all of the materials are functionally equivalent and are well known to substitute with each other as taught by Hashimoto et al.

6. Claims 30-32 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Park in view of Yoshimura et al and further in view of Miyata et al.

As to claims 31-32, Park teaches above in the paragraph 4 that multilayer of the SOG can be used and it would have been obvious to one of ordinary skilled in the art at the time of claimed invention to expose the first and the second layer of SOG layer for forming the multilayer device as suggested by Park.

As to claim 37, park fail to teach the SOG is silicone rubber.

However, Miyata et al teach the use of silicone SOG having excellent stability with time (col.4, lines 49-58).

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of claimed invention to employ Miyata et al's teaching into modified Park's process by incorporating the silicone (rubber) SOG for excellent stability with time as suggested by Miyata et al.

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7. Claims 12 and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyata et al (5,888,846) in view of Yoshimura et al and further in view of Applicant's admission.

Modified Miyata et al discusses above in the paragraph 5 but remain silent regarding the recess is formed by **molding**.

However, Applicant admits that it is known in the lithographic art that a mold is pressed in the curable resin in this case SOG layer and the mold is released to form pattern or recess or protrusions in the SOG layer (see the specification page 1, last paragraph).

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of claimed invention to modify Miyata et al's process with the conventional process for easily forming pattern in the SOG layer as suggested by Applicant's admission.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

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shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shamim Ahmed whose telephone number is (571) 272-1457. The examiner can normally be reached on Tu-Fri (12:30-10:30) Every Monday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G. Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Shamim Ahmed/
Primary Examiner, Art Unit 1792

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